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Cold Atom Optical Lattices as Quantum Analog Simulators for Aperiodic One-Dimensional Localization Without Disorder VITO SCAROLA, SANKAR DAS SARMA, University of Maryland — Cold atom optical lattices allow for the study of quantum localization and mobility edges in a disorder-free environment. We predict the existence of an Anderson-like insulator with sharp mobility edges in a one-dimensional nearly-periodic optical lattice. We show that the mobility edge manifests itself as the early onset of pinning in center of mass dipole oscillations in the presence of a magnetic trap which should be observable in optical lattices. This work is supported by NSA-LPS and ARO-ARDA.

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